

Book review

The Return of Caribou to Ungava

A.T. Bergerud, Stuart Luttich, & Lodewijk Camps. "The Return of Caribou to Ungava." McGill-Queen's University Press, Montreal, Quebec. 586pp. ISBN 978-0-7735-3233-5.

Labs of scientists may vary in comfort and set up. Bergerud, Stuart, and Camps' "lab" is located hundreds of kilometres away into the barrens; it has no walls and frequently it is closed due to fog, rain, snow, low temperatures, strong winds and the absence of animals. Data are hard to come by in such labs.

Despite these challenges, many years of hard work in the tundra and taiga of Labrador have produced this rather remarkable book. The book integrates the dramatic story of the rise and fall of the Ungava caribou with comprehensive and updated knowledge on both caribou and reindeer population ecology. The authors discuss the abundance and distribution of the George River Herd from the time the Moravian mission arrived in Labrador in the late 1700s through 1900. The senior author's first survey in 1958 occurred at a time when the herd numbered 15 000 animals and was threatened by extinction, and followed through to an all time high of 600 000 animals in 1988 ranging over a vast area of 750 000 km², and to below 300 000 animals in 2001.

The authors make their case in 16 chapters including 537 pages, 89 tables, 192 figures and 759 references: The Ungava caribou population could not be regulated by wolves with endemic rabies. Instead depleted spring/early summer ranges resulting from extreme caribou densities resulted in negative demography operating primarily on natality. The authors conclude that the classic view that winter lichen abundance limits the growth of the migratory herds is invalid if the herds can continue to expand their space across extensive forest taiga.

Throughout the book the reader is alternately delighted, challenged and, perhaps, surprised by the synthesis of observations from more than 70 years of caribou field experience, com-

bined with inquiring minds. A limited number of examples illustrate this point:

- The eruption hypothesis predicts that an ungulate species that erupt in numbers will experience a major crash, followed by a long interval while forage recovers (p. 179). The George river herd erupted but a crash did not follow. The hypothesis was originally applied to insular *Rangifer* populations, however, the caribou on the Slate island in Ontario over-utilized their summer pastures (like the George river herd) and crashed over winter in absence of adequate lichen supplies. The herd showed a major recovery in size in a matter of only 2 to 3 years.
- Female antler casting (pp. 229-232): The authors discuss the dominance hypothesis vs. the nutrient/foetus hypothesis and find support for the latter. May is the critical month of growth for the foetus. Females by casting antlers after parturition and delaying the growth of the new set until 2 to 3 weeks postpartum apparently provide maximum nutrients at the time they are most needed by the new nursing neonate.
- In addressing the effects of global warming on caribou (p. 431) the authors focus on the interaction of tree line, moose advancement, wolves and caribou as important. Moose have been pushing north for decades, increasing the food base of, and thus the abundance of wolves. Increased abundance of wolves, coupled with the loss of habitat that has reduced the spacing-out advantages of woodland caribou, has resulted in an alarming rate of extinction in local populations on the southern edge of their range.
- In Chapter 15 "Spacing hypothesis of calving and migration", the authors present a comprehensive discussion of "the Nutrition

destination hypothesis" vs. the "Predation displacement hypothesis". They conclude that the first priority of the spring migration of pre-parturient females in North American caribou herds is to reach the relative safety of the tundra for calving and, secondarily, to maximize their condition - when possible - in the later stages of gestation, thereby enhancing neonate birth weight and viability. These spring migrations prolong winter conditions resulting in a negative energy balance and weight loss compared to barren females remaining with the males further south and following the green phenology north. Pre-parturient wild reindeer in southern Norway follow the same strategy utilizing altitudinal rather than latitudinal safety.

The Return of Caribou to Ungava consists of chapters on: Setting and background (1), Taxonomy, ecotypes, herds and morphology (2), Return of caribou to Ungava after last ice age (3), Abundance and distribution of sedentary caribou (4), Past population fluctuations (5), Causal factors in historical fluctuations (6), Forage and range (7), Body and antler growth (8), Physical condition (9), Recruitment, mortality and population growth (10), Limiting factors (11), The use of space (12), Environmental factors in distribution and movement (13), Optimal foraging and predation risk in winter and growing season (14), Spacing theory of calving and migration (15), Population regulation (16), and an appendix on Summer energy budgets for lactating females, a bibliography and an index.

Some parts of the book I find less informative, due to too many details and speculations on topics which apparently are not within the authors "home ground", or where I feel data are over-extrapolated. In particular the appendix chapter "Summer energy budgets for lac-

tating females" could have been omitted. This model approach repeats in a general way old news already presented and discussed in other chapters of the book. Some other examples: In the section activity and energy budgets (chapter 7, p. 174-76) the authors present and compare activity budgets (Table 7.8) and dry matter intake estimates (Fig. 7.12) that appear to be too general to be conclusive. Also on p. 193 correlations between birth weights and mean temperature in May and negative correlation between birth weights and spring break up of ice in Knob lake are too general. Correlations should be causal in order to be biologically interesting and in the aforementioned examples I am not convinced of the causal relationship.

There are also some errors and inconsistencies (e.g. wolf and moose mixed in the text to Fig. 2.6; reindeer belong to the old world (Svalbard and Taimyr are reindeer not caribou); some tables lack frames (e.g. Tables 2.4, 8.7, 8.9).

These objections, however, are small compared to the work done. The authors have produced an excellent, comprehensive and well written book on caribou and reindeer population ecology, with special emphasis on the Ungava caribou. The thoughtful and knowledgeable discussions within almost all important *Rangifer* topics make the book a valuable reference source not only for caribou and reindeer biologists but also for ungulate biologists and ecologists in general. A very important contribution lies in the authors' creative thinking, combined with long field work experience with the caribou and their environment.

In closing this book review it surprised to learn from the Acknowledgements that Newfoundland Hydro, a company which has made a huge footprint on the landscape in southern Labrador turned down the many requests to support the printing of this book.

Eigil Reimers